

(12) **United States Patent**
Zatezalo et al.

(10) **Patent No.:** **US 6,339,718 B1**
 (45) **Date of Patent:** **Jan. 15, 2002**

(54) **PROGRAMMABLE INJECTOR CONTROL**

(75) **Inventors:** **Doug Zatezalo; Jeffrey John Thompson**, both of Allison Park; **Steven C. Rygg**, Irwin; **Scott R. Griffith**, Delmont; **John Gardner**, Wexford; **Ronald Barbati**, Pittsburgh, all of PA (US)

(73) **Assignee:** **Medrad, Inc.**, Indianola, PA (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **09/365,278**

(22) **Filed:** **Jul. 30, 1999**

(51) **Int. Cl.**⁷ **A61B 6/00; A61M 5/00**

(52) **U.S. Cl.** **600/432; 604/92; 604/232; 604/246; 604/247; 604/281; 604/154; 604/131; 604/65; 604/66; 604/67; 604/27; 604/134**

(58) **Field of Search** **600/432, 410, 600/420, 3, 4, 5; 604/92, 232, 246, 247, 281, 154, 131, 65, 66, 67, 27, 134**

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,888,239 A * 6/1975 Rubinstein 600/432
 5,472,403 A * 12/1995 Cornacchia et al. 600/4
 5,494,036 A * 2/1996 Uber, III et al. 600/432

OTHER PUBLICATIONS

Optistar MR Injector System 510(k) Summary (Nov. 4, 1998).

Optistar MR Contrast Delivery System Brochure (2000).

Optistar MR Digital Injection System Operator's Manual, 801900-A (Nov. 1999).

MR Sonic Shot 50 Operator's Manual (with Accompanying English Translation of Chapter 11), Ver.2.0.0 (Dec. 24, 1999).

Injektron 82 MRT User Instructions, Version MR 2 (Mar. 10, 1999).

Medrad Vistron CT Injector System Operation Manual; pp. 21-26 (2000); 95403-T-141, Rev. B.

* cited by examiner

Primary Examiner—Marvin M. Lateef

Assistant Examiner—Jeoyuh Lin

(74) *Attorney, Agent, or Firm*—Ian K. Samways; George L. Bradley

(57) **ABSTRACT**

A fluid injection arrangement, in the context of patient imaging systems, in which phases of contrast medium injection and flushing medium injection can be freely and selectably ordered so as to make available to the operator and patient a vast array of possible protocols that has hitherto been essentially unattainable. Also contemplated is the use of a "hold" phase, involving an indefinite pause between phases of a protocol, in connection with such imaging systems. Further contemplated is the use of a "pause" phase in which a pause of fixed duration is pre-programmed into the protocols of MRI injector systems.

80 Claims, 6 Drawing Sheets

